COMPARISON OF ARAC PROPOSAL TO FAA PROPOSAL
AC/AMJ25.1309
DISCUSSION OF MAJOR POLICY DIFFERENCES

ARAC PROPOSAL	FAA PROPOSAL	DISCUSSION OF DIFFERENCES
1. PURPOSE	1. PURPOSE	None.
2. CANCELLATION	2. CANCELLATION	None.
3. RELATED DOCUMENTS	3. RELATED DOCUMENTS	None.
4. APPLICABILITY (b) 25. 671(c)(1) and (c)(3) are excepted from 25.1309(b)(1)(ii)	4. APPLICABILITY (b) Only 25.671(c)(1) is excepted (g) Explain that 1309 is applicable to any installed equipment, be it for type cert, operating rules, or optional. (h) 25.1309 is not applicable when the a/c is "out of service" on the ground only. (i) Threats to persons outside of the aircraft is to be considered.	(b)JAR 671(c)(1) allows probabilistic consideration of single failures of flt cont.. FAR does not. (g), (h), and (i) FAA version further defines applicability of 25.1309.
5. DEFINITIONS Does not define the term "Catastrophe"	5. DEFINITIONS -"Catastrophe" is defined as intended by the rule language. -"Specific Probability Per Flight Hour" is defined in addition to "Average Probability Per Flight Hour".	-The term "Catastrophe" appears in the FAA proposed rule. -"Specific Risk" is addressed in the FAA's version.

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6. BACKGROUND	6. BACKGROUND (c)Add this paragraph to explain the intended application of the term "extremely improbable". (d)Add this paragraph to provide a historical background on the use of probability and the derivation of the numerical value for "extremely improbable". This paragraph is similar to paragraph (a) of the ARAC version. (e)(1)Explains the needs to assure the overall probability of 10^{-7} per flt-hr of a serious accident is not exceeded. (e)(5)Explains the needs to evaluate not only the "average risk" but also the variation in risk as a function of airplane configuration, environmental conditions, latent failures, etc.... The concept of "specific risks" is discussed and is defined as the "anticipated risk a specific airplane encounters under specific conditions."	(c)Standardize the meaning of the term. (d)&(e)(1) Background for the FAA's proposal for 1309(b)(1). The assumption of having less than 100 catastrophic failure conditions may no longer be valid in today's complex system designs, if the 10^{-9} limit is continued to be justified for <u>each</u> catastrophic failure condition. (e)(5) The FAA had intended for the issue of "specific risk" to be covered as part of the "*airworthiness approval for fault tolerant system,*" "*instructions for continued airworthiness of fault tolerant system,*" and "*use of operational factors in the safety assessment process*" that were specified in the Terms of Reference for the SDAHWG. However, that issue was not addressed in the HWG's meetings due to limited time. Therefore, the FAA is proposing the respective changes in the AC for ARAC's review.
7. FAILURE COND. CLASSIFICATION... (b)(1) <u>Probable</u> Failure Conditions are anticipated to occur one or more times during the entire operational life of each airplane.	7. FAILURE COND. CLASSIFICATION... (b)(2) <u>Infrequent</u> Failure Conditions are <u>not anticipated to occur to each airplane every year</u>, <u>but</u> may occur one or more times during the entire operational life of each airplane.	The FAA adds the qualitative probability term "infrequent failure condition" to better limit the frequency of occurrence of failure conditions that are less severe but are much more numerous than hazardous/catastrophic conditions. The definition of "probable failure condition" does not limit how often a failure condition can occur. See justification on the rule changes.

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(c)(1) A Probable Failure Condition has an average probability/flt-hr greater than of the order of $1x10^{-5}$.	(c)(1)&(2) A Probable Failure Condition has an average probability/flt-hr greater than $1x10^{-5}$. An Infrequent Failure Condition has an average probability/flt-hr of the order of $1x10^{-3}$ or less. Figures 1 and 2 are revised accordingly.	
8. SAFETY OBJECTIVE (a)(2)Minor failures have no limits. (c)&(d) Establish the numerical criteria for a catastrophic failure condition but also allow a way to circumvent that criteria by providing policies for managing the overall risk of an accident (10^{-7}/flt-hr).	8. SAFETY OBJECTIVE (a)(2) Minor failures are required to be Infrequent. (c)No provision for circumventing the numerical criteria of a catastrophic failure condition. The overall risk of an accident (a catastrophe) is regulated by the FAA proposed rule 25.1309(b)(1).	A policy for determining an acceptable means of compliance should not circumvent the rule it intends to comply with. The FAA contends the ARAC AC/AMJ paragraph 8.d directly conflicts with the 1309(b)(1) rule it intends to comply with, and therefore constitutes rulemaking by AC – a practice not allowed at the FAA.
9.a. COMPLIANCE WITH 25.1309(a)	9.a. COMPLIANCE WITH 25.1309(a)	No policy differences.
9.b. COMPLIANCE WITH 25.1309(b)	9.b. COMPLIANCE WITH 25.1309(b)	No policy differences.
9.c. COMPLIANCE WITH 25.1309(c)	9.c. COMPLIANCE WITH 25.1309(c)	No policy differences.
10. IDENTIFICATION OF FAILURE	10. IDENTIFICATION OF FAILURE .... Added paragraphs 10.c.2.c, d, e, and f (f is "rough around the edges" and need to be thoroughly discussed by the working group)	No significant policy differences
11.a. ASSESSMENT OF FAILURE COND...	11.a. ASSESSMENT OF FAILURE COND... Added paragraph (5) which is a preamble for 11.d.4.	No significant policy differences.
11.b. SINGLE FAILURE CONSIDERATIONS	11.b. SINGLE FAILURE CONSIDERATIONS Added par (2) reinforcing the need to look for "obscure" single failure modes.	No significant policy differences.
11.c. COMMON CAUSE FAILURE...	11.c. COMMON CAUSE FAILURE ...	No policy differences.

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11.d. DEPTH OF ANALYSIS	11.d. DEPTH OF ANALYSIS Added paragraphs (4)(e)-(j)	Detailed discussion of "**specific risk**" policy. The central question is: If the safety assessment identifies an airplane can be exposed to catastrophic single failures for more than one flight (e.g. operation with a pre-existing fault + a subsequent single failure), what is an acceptable risk level for those specific flights?
11.e. CALCULATION OF AVE. PROB...	11.e. CALCULATION OF AVE. PROB...	No policy differences.
11.f. INTEGRATED SYSTEMS	11.e. INTEGRATED SYSTEMS	No policy differences
11.g. OPERATIONAL OR ENVIRONMENTAL CONDITIONS	11.g. OPERATIONAL OR ENVIRONMENTAL CONDITIONS	No policy differences
11.h. JUSTIFICATION OF ASSUMPTIONS	11.h. JUSTIFICATION OF ASSUMPTIONS..	No policy differences
12. OPERATIONAL AND MAINTENANCE CONSIDERATIONS	12. OPERATIONAL AND MAINTENANCE CONSIDERATIONS Added 12.c. INSTRUCTION FOR CONTINUED AIRWORTHINESS	The process of finding compliance to 25.1309 may identify information that are essential to the instructions for continued airworthiness (ICA). (This policy fulfills one of the tasks assigned to HWG is to identify the ICA – see TOR)
13. ASSESSMENT OF MODIFICATION...	13. ASSESSMENT OF MODIFICATION...	No policy differences.
APPENDICES 1-4	APPENDICES 1-4	No major differences. In App 4, the terms "Normal Icing" and "Severe Icing" are replaced by "Appendix C Icing Conditions" and "Exceedance of Appendix C maximum atmospheric icing conditions" respectively, per the Ice Protection Harmonization Working Group member's request.

U.S. Department
of Transportation

**Federal Aviation
Administration**

Transport Airplane Directorate
Aircraft Certification Service

1601 Lind Avenue, S.W.
Renton, Washington 98055-4056

May 10, 2001

Mr. Craig R. Bolt
ARAC TAEIG, Assistant Chair
Pratt & Whitney
400 Main Street
East Hartford, CT 06108

Dear Mr. Bolt:

We apologize for the delay in completing our review of the rulemaking and guidance material developed by the Systems Design and Analysis Harmonization Working Group. These documents address proposed changes to Sections 25.901, 25.1301, 25.1309, and 25.1310 of the Federal Aviation Regulations.

The documents are returned to you for consideration under procedures similar to that used in Phase 4 of the "fast-track" process. The Phase 4 review provides ARAC the opportunity to review the NPRM and associated advisory material. The working group should focus on identifying and discussing concerns with the draft proposal and guidance, resolving concerns raised by the group to the extent possible. Although desirable, consensus is not required from the working group. More important is the dialogue, reconciliation where possible, and documentation of alternatives considered by the working group and put forth to ARAC for consideration. The FAA will ensure that issues raised but unresolved by the working group or ARAC are addressed in the preamble to the Notice of Proposed Rulemaking.

The FAA has completed technical, writer-editor, and legal reviews, and has determined it most efficient to postpone formal economic review pending completion of further input from the working group and ARAC in consideration of enclosed data justifying the revisions incorporated and receipt of your formal recommendations on this task.

To facilitate review of these documents by the working group and ARAC, we are providing (1) a comparison document illustrating differences between this proposal and the proposal you submitted during the summer of 1998 and (2) examples of unsafe conditions, accidents and incidents substantiating the necessity for assessing specific risk. This information is provided to substantiate the FAA's position that "specific risk" be covered as part of (1) the airworthiness approval for fault tolerant systems; (2) instructions for continued airworthiness of fault tolerant systems, and (3) use of operational factors in the safety assessment process. Our review of service data and certification methods substantiates the need to improve the quality and

consistency of safety assessments. While the terms of reference may not explicitly include a requirement to assess specific risk, we believe it is well within the scope of the existing task.

This is an important safety initiative and your advice and input on this issue will go a long way in producing a better product. Recognizing the need to reconstitute a working group that has been dormant for some time, we ask that ARAC complete its review of these drafts and submit its recommendations to the FAA within 9 months of receipt of this request. If you have any questions or concerns, please feel free to contact John McGraw, Acting Assistant Executive Director, Transport Airplane and Engine Issues, at 425-227-1171.

Sincerely,

/s/

Anthony F. Fazio
Executive Director
Aviation Rulemaking Advisory Committee

7 Enclosures